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PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

Kenichiro SATO et al

Appln. Serial No.: 09/541,597

Group Art Unit: 1752

Filed: April 3, 2000

Examiner: R. ASHTON

For: POSITIVE PHOTORESIST COMPOSITION FOR FAR ULTRAVIOLET EXPOSURE

DECLARATION UNDER 37 C.F.R. §1.132

Commissioner for Patents
Washington, D.C. 20231

Sir:

I, Kenichiro Sato, do declare and state that:

I am a citizen of Japan,

I graduated from Osaka University, Faculty of Engineering,
Course of Applied Fine Chemistry in March of 1992;

Since April of 1992, I have been employed by Fuji Photo Film Co., Ltd., where I have been engaged in research and development in the technology of photoresist photosensitive materials for semiconductors; and

I am a co-inventor of the above-identified application.

DECLARATION UNDER 37 C.F.R. §1.132

Application No. 09/541,597

In order to demonstrate the unexpected superiority achieved by the present invention over the disclosures of Goodall et al, Allen et al and Aoai et al, the following experimentation was carried out under my supervision and control.

The photoresist composition solutions were prepared as set forth in the examples of the specification, page 129, except that the ingredients shown in Tables 1 and 2 below were used.

COMPARATIVE EXPERIMENTATION

The inventive examples and comparative examples described in Table 1 below are photoresist compositions containing combinations of an acid decomposable resin, a photo-acid generator and a surface active agent (i.e., surfactant). The inventive examples are representative of the three components according to claims 4 to 8 of the present invention.

The symbols in the following Table 1 were corresponding to those described in Table 3 of the present specification. The resins which were within the scope of the present invention prepared by Synthesis Examples 56, 57 and 58 in Table 1 are those described in Goodall et al.

DECLARATION UNDER 37 C.F.R. §1.132

Application No. 09/541,597

TABLE 1

	(B) Acid Decom- posable Resin	(A) Photo- decom- posable Generat- or	Surface Active Agent	Number of Develop- ment Defects	Defocus Latitude Depended on Line Pitch	Particle (Initial Value)
Example a	(1)	1	W-2	32	0.7	22
Example b Synthesis Example 56*		1	W-2	65	0.5	43
Example c Synthesis Example 57**		1	W-2	72	0.5	49
Example g Synthesis Example 58***		1	W-2	58	0.5	39
Comp. Example a'	(1)	1	None	10200	0.1	1630
Comp. Example b'	Synthesis Example 56*	1	None	13100	0.1	2310
Comp. Example c'	Synthesis Example 57**	1	None	14300	0.1	3420
Comp. Example g'	Synthesis Example 58***	1	None	8470	0.1	2190
Comp. Example b"	Synthesis Example 56*	1	W-4	3250	0.2	1130

: "56" means a compound synthesized in Example 56 of Goodall et al.

: "57" means a compound synthesized in Example 57 of Goodall et al.

: "58" means a compound synthesized in Example 58 of Goodall et al.

DECLARATION UNDER 37 C.F.R. §1.132

Application No. 09/541,597

As is apparent from the comparison between Example a and Comparative Example a', the comparison between Example b and Comparative Example b', the comparison between Example c and Comparative Example C' and the comparison between Example g and Comparative Example g', the inventive examples obtained by the combination of the claimed resin and the claimed surface active agent of the present invention show an unexpected decrease in the number of development defects and excellent and unexpected effects in the defocus latitude depended on line pitch. Accordingly, the inventive examples also show an excellent and unexpected improvement in the initial value of the particle (i.e., the particle number is less at the initial stage).

Further, as is apparent from the comparison between Example b and Comparative Example b'', even if the Surface Active Agent (W-4) which is outside of the scope of the present invention is combined with the resin of the present invention, the excellent effect of the present invention can not be obtained.

Now, it has not been entirely reported that the excellent effects of the present invention (in which the development defect is less, the defocus latitude depended on line pitch is improved and the particle initial value is less) can be obtained by the surface active agent.

DECLARATION UNDER 37 C.F.R. §1.132

Application No. 09/541,597

That is, the effects of the present invention have not been known as the effects due to the surface active agent, and therefore the effects of the present invention are a specific effect due to the present invention.

Therefore, it is believed that the present invention can not be unexpected from and achieved by combination of Goodall et al which do not disclose the surface active agent of the claimed invention, and Allen and Aoai et al which do not disclose the resin of the claimed invention.

Also, the inventive examples and comparative examples described in Table 2 below are compositions containing combinations of an acid decomposable resin, a photo-acid generator and a solvent.

The inventive examples are representative of the three components according to claims 9 to 14 of the present invention.

The symbols in the following Table 2 were corresponding to those described in Table 5 of the present specification.

The resins which were within the scope of the present invention prepared by Synthesis Examples 56, 57 and 58 in Table 2 were those described in Goodall et al. The mixed Solvent S1/S3, which is within the scope of the present invention, is one described in Allen et al.

DECLARATION UNDER 37 C.F.R. §1.132

Application No. 09/541,597

TABLE 2

<u>Example No.</u>	<u>(B) Acid Decomposable Resin</u>	<u>Solvent (Weight Ratio)</u>	<u>Particle (Initial Value)</u>	<u>Particle Number after Storage</u>	
Example d	(1c)	S1/S3 (80/20)	35	19	
Example e-1	Synthesis Example 56*	S1/S3 (75/25)	80	25	S1 & PGMEA
Example e-2	Synthesis Example 56*	S1/S4 (80/20)	72	21	S2 PGMEA
Example e-3	Synthesis Example 56*	S2/S3 (70/30)	95	39	S3 EL
Example e-4	Synthesis Example 56*	S3/S5 (60/40)	93	28	S4 PGMEA
Example f	Synthesis Example 57**	S1/S3 (70/30)	84	26	S5 Butyl tetra
Comp. Example d'	(1c)	PGMEA	1200	19500	S4 / S5
Comp. Example e'	Synthesis Example 56*	PGMEA	2210	20350	S3 / S5
Comp. Example f'	Synthesis Example 57**	PGMEA	2510	22530	S1 / S3
Example h-1	Synthesis Example 58***	S1/S3 (80/20)	65	32	S1 / S4
Example h-2	Synthesis Example 58***	S1/S4 (75/25)	67	34	S3 / S5
Example h-3	Synthesis Example 58***	S2/S3 (70/30)	72	39	S4 / S5
Example h-4	Synthesis Example 58***	S3/S5 (60/40)	69	31	
Comp. Example h'	Synthesis Example 58***	PGMEA	640	13710	

DECLARATION UNDER 37 C.F.R. §1.132

Application No. 09/541,597

- *: "56*" means a compound synthesized in Example 56 of Goodall et al.
- **: "57**" means a compound synthesized in Example 57 of Goodall et al.
- ***: "58***" means a compound synthesized in Example 58 of Goodall et al.

As is apparent from the results of the comparison between Example d and Comparative Example d', the comparison between Examples e-1 to e-4 and Comparative Example e', the comparison between Example f and Comparative Example f' and the comparison between Examples h-1 to h-4 and Comparative Example h', an unexpected and excellent effect in storage stability over time can be obtained by the combination of the claimed resin and the claimed mixture of solvent and amounts.

That is, as is apparent from the comparison between the particle initial value and the value of the particle number after storage, in the inventive examples, the particle number at the initial stage is unexpectedly less than those of the comparative examples and further the increase in particle number after storage(i.e., after the passage of time) is unexpectedly less.

Now, it has not been entirely reported that the excellent effects of the present invention (in which the particle number at the initial stage is less and the increase in particle number after storage is reduced) can be obtained by the (mixed) solvent.

DECLARATION UNDER 37 C.F.R. §1.132

Application No. 09/541,597

That is, the effects of the present invention has not been known as the effect due to the mixed solvent, and therefore the effects of the present invention are the specific one obtained by selecting the specific resin and the specific (mixed) solvent.

Accordingly, it is believed that the present invention and the effect of the claimed invention can not be unexpected from and achieved by combination of Goodall et al which do not disclose the mixed solvent of the claimed invention, and Allen et al which do not disclose the resin of the claimed invention.

I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Date : _____

Name : _____

Kenichiro Sato